MC

046
3-22-01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT APPLICATION

#3

In the Application of:

	Guven et al.	Atty. Docket: TI-32148
Serial No.:	09/750,264	Art Unit: TBD
Filed:	December 29, 2000	Examiner: TBD
For:	MODEM RELAY PROTOCOL REDUNDANCY FOR RELIABLE LOW SPEED MODEM COMMUNICATIONS OVER IP NETWORKS WITH SUBSTANTIAL PACKET LOSS	Date: April 16, 2001

Assistant Commissioner for
Patents
Washington, D.C. 20231

CERTIFICATE OF MAILING 37 CFR §1.8(a)

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D. C. 20231 on the date indicated below.

4/16/01

Warren L. Franz, Reg. No. 28,716

LETTER TO THE OFFICIAL DRAFTSPERSON

Sir:

Please find enclosed eight (8) sheets of substitute/formal drawings for the subject application as required by the Notice to File Corrected Application Papers mailed February 15, 2001, a copy of which is also enclosed.

Respectfully submitted,

4/16/01

Texas Instruments Incorporated
P. O. Box 655474, M/S 3999
Dallas, Texas 75265
(972) 917-5271

Warren L. Franz
Attorney for Applicant(s)
Reg. No. 28,716

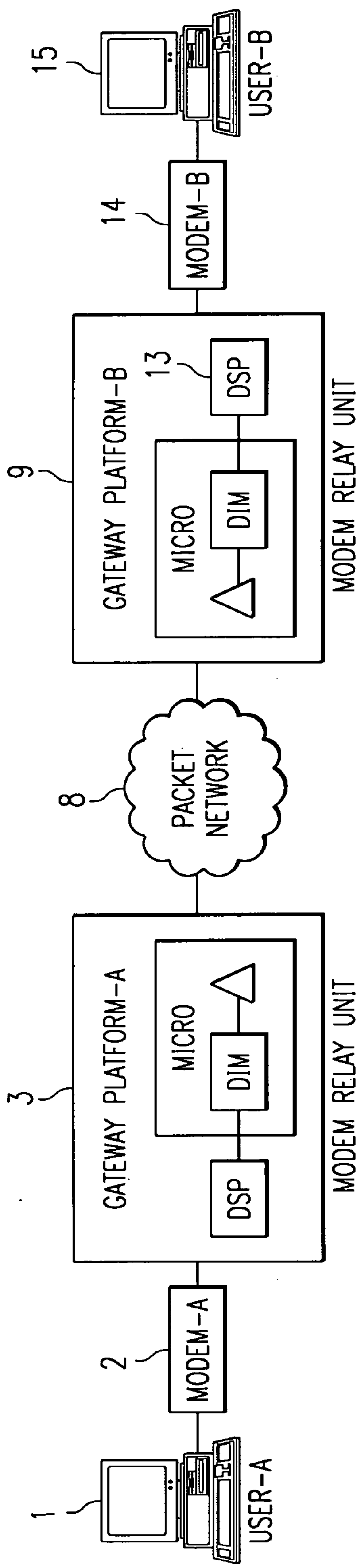

1
USER-A
2
MODEM-A
3
GATEWAY PLATFORM-A
MICRO
DIM
DSP
MODEM RELAY UNIT
8
PACKET NETWORK
9
GATEWAY PLATFORM-B
MICRO
DIM
13
DSP
MODEM RELAY UNIT
14
MODEM-B
15
USER-B

FIG. 1

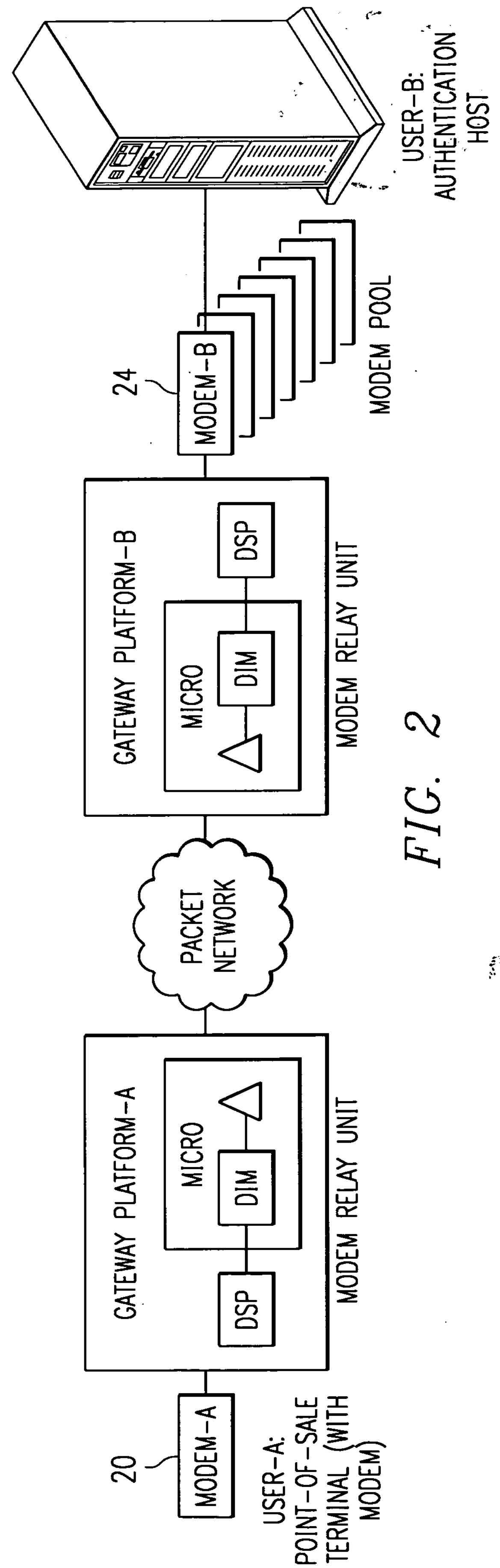

20
MODEM-A
USER-A: POINT-OF-SALE TERMINAL (WITH MODEM)
GATEWAY PLATFORM-A
MICRO
DIM
DSP
MODEM RELAY UNIT
PACKET NETWORK
GATEWAY PLATFORM-B
MICRO
DIM
DSP
MODEM RELAY UNIT
24
MODEM-B
MODEM POOL
USER-B: AUTHENTICATION HOST

FIG. 2

FIG. 3

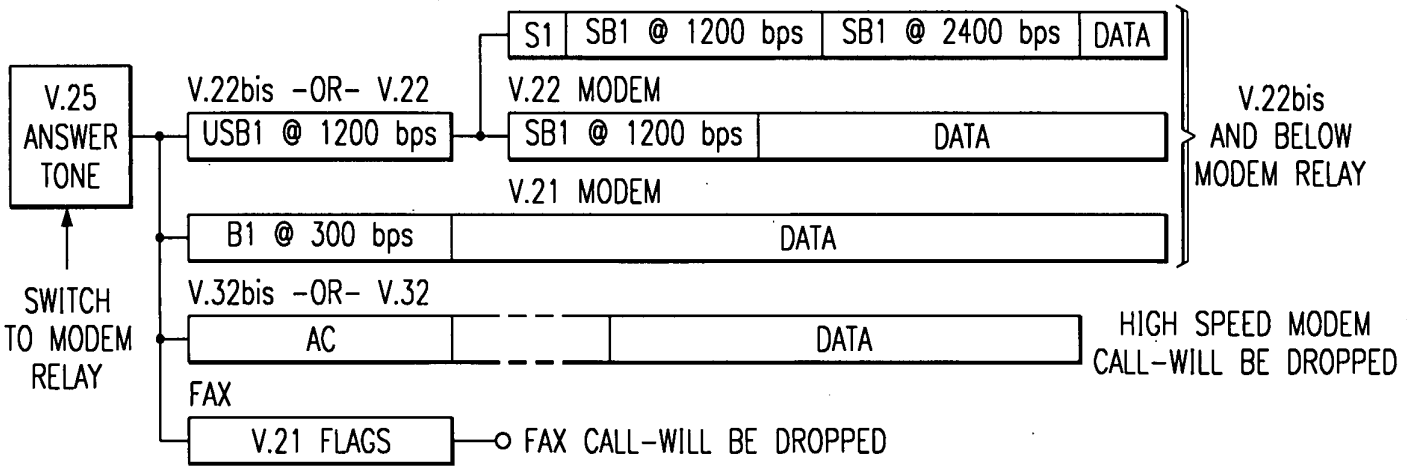
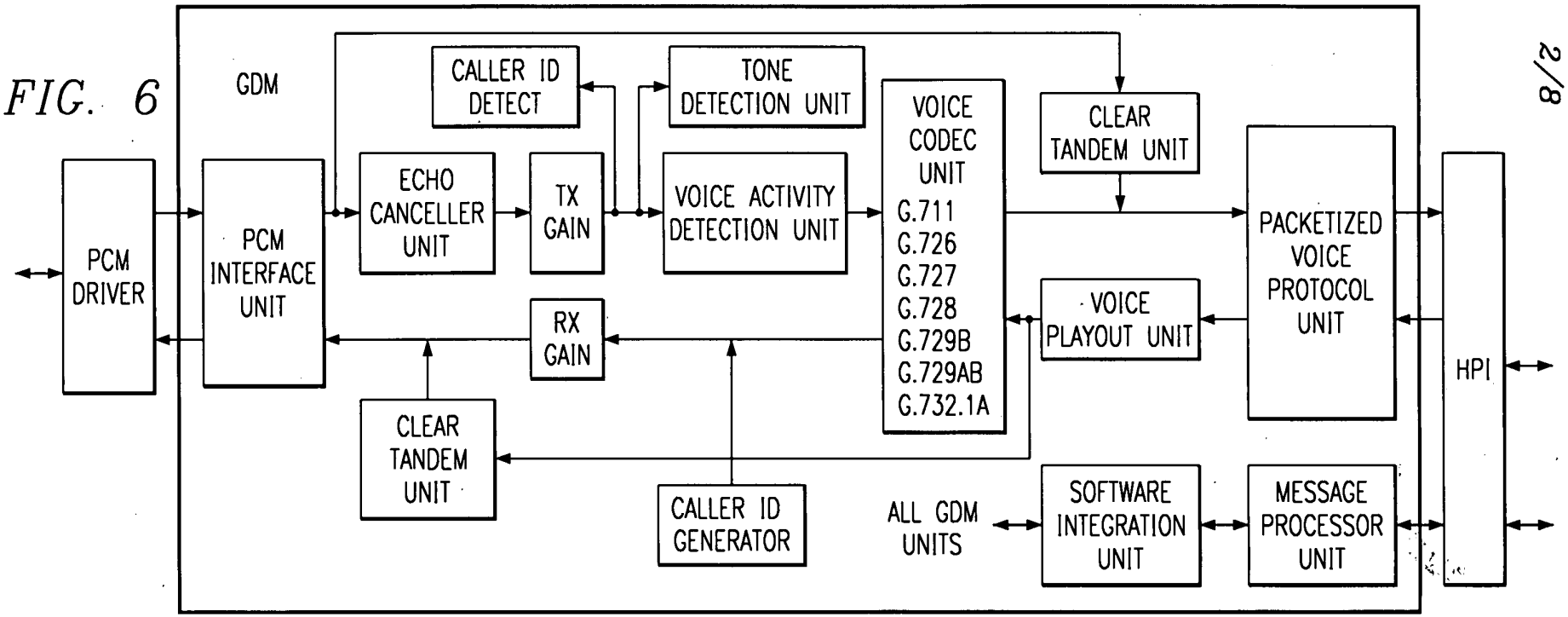

V.25 ANSWER TONE
SWITCH TO MODEM RELAY
V.22bis -OR- V.22
USB1 @ 1200 bps
S1
SB1 @ 1200 bps
SB1 @ 2400 bps
DATA
V.22 MODEM
SB1 @ 1200 bps
DATA
V.22bis AND BELOW MODEM RELAY
V.21 MODEM
B1 @ 300 bps
DATA
V.32bis -OR- V.32
AC
DATA
HIGH SPEED MODEM CALL-WILL BE DROPPED
FAX
V.21 FLAGS
FAX CALL-WILL BE DROPPED

FIG. 6


GDM
CALLER ID DETECT
TONE DETECTION UNIT
VOICE CODEC UNIT
G.711
G.726
G.727
G.728
G.729B
G.729AB
G.732.1A
CLEAR TANDEM UNIT
PACKETIZED VOICE PROTOCOL UNIT
PCM DRIVER
PCM INTERFACE UNIT
ECHO CANCELLER UNIT
TX GAIN
VOICE ACTIVITY DETECTION UNIT
RX GAIN
VOICE PLAYOUT UNIT
HPI
CLEAR TANDEM UNIT
CALLER ID GENERATOR
ALL GDM UNITS
SOFTWARE INTEGRATION UNIT
MESSAGE PROCESSOR UNIT

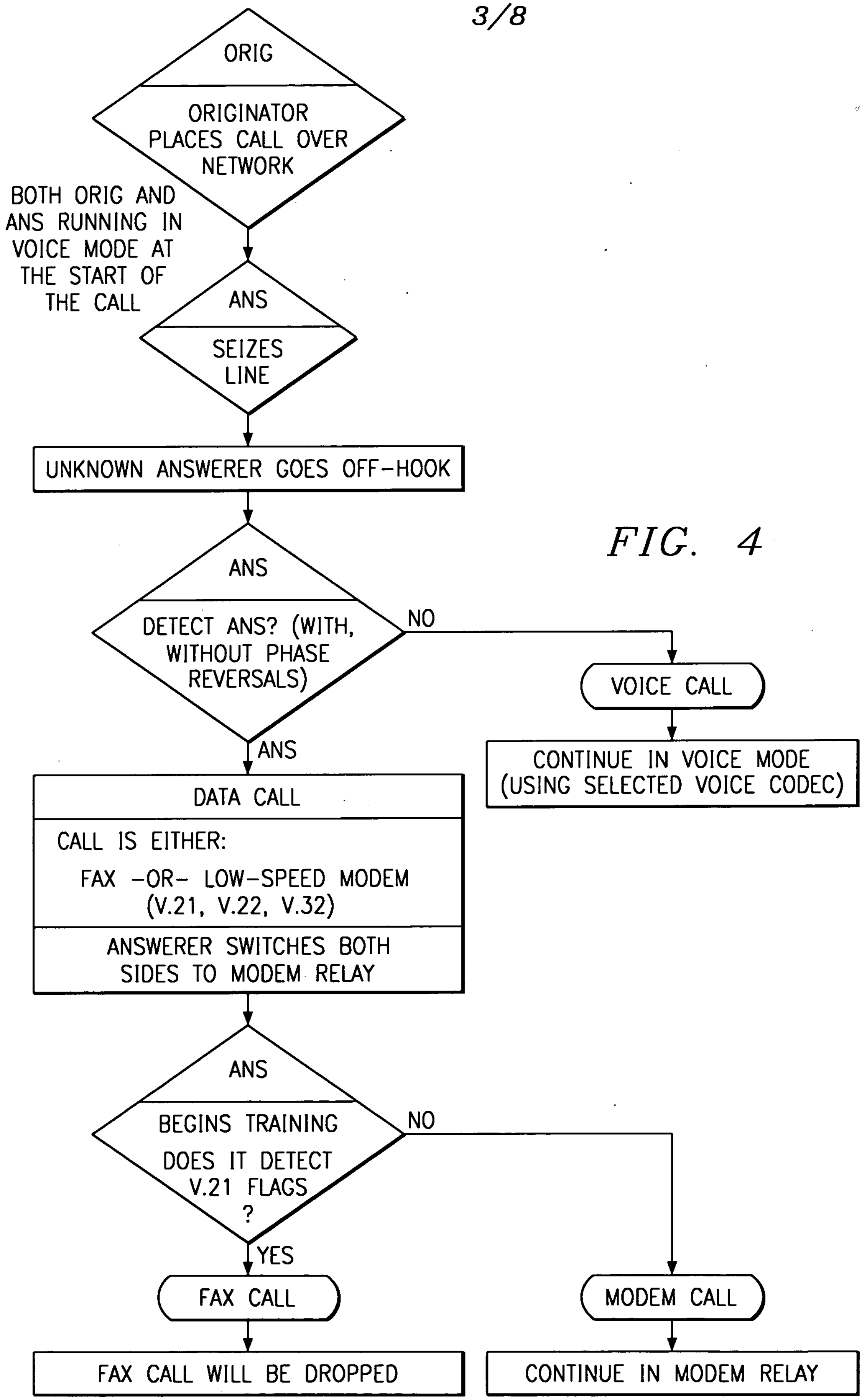


FIG. 4

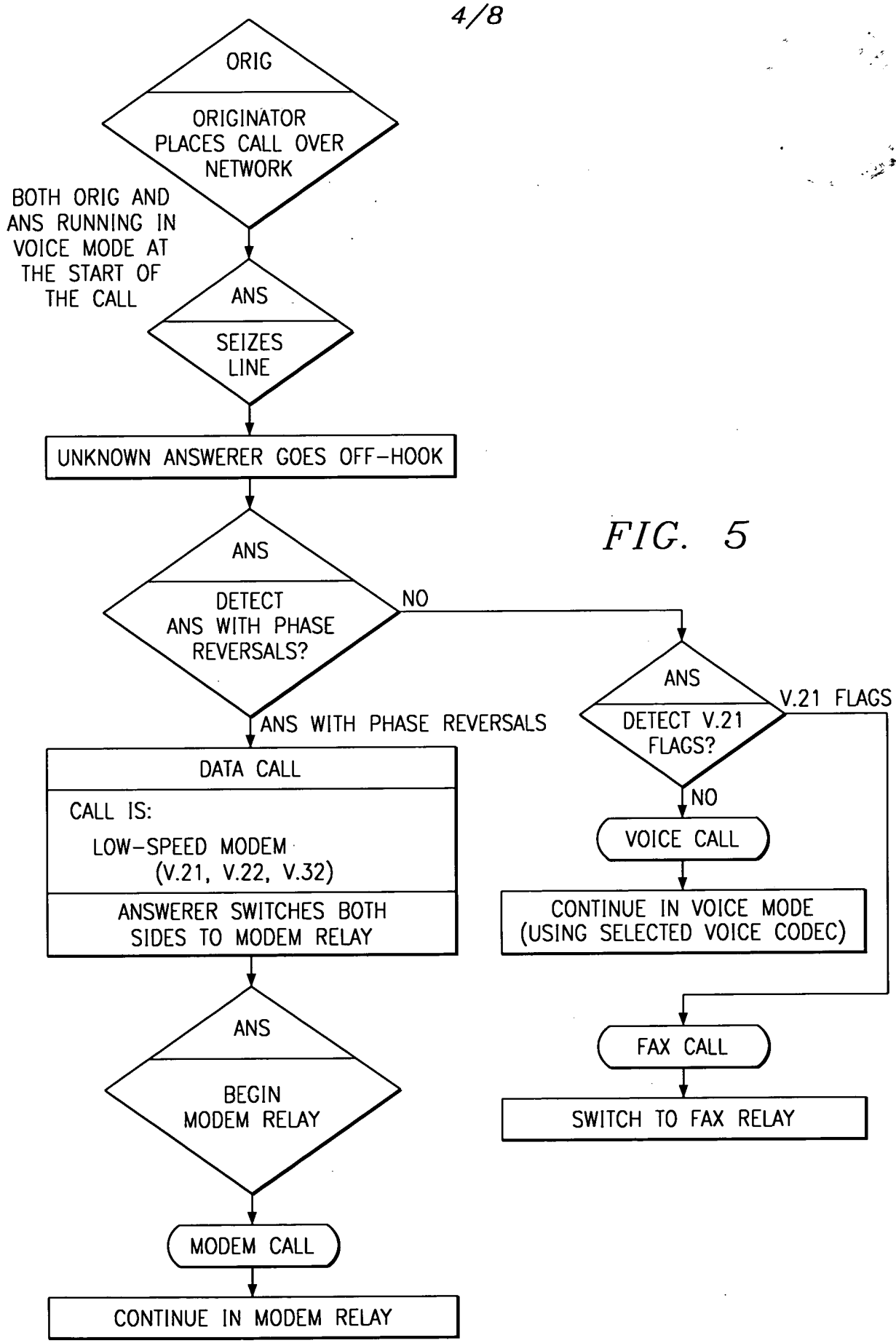

ORIG
ORIGINATOR PLACES CALL OVER NETWORK
BOTH ORIG AND ANS RUNNING IN VOICE MODE AT THE START OF THE CALL
ANS
SEIZES LINE
UNKNOWN ANSWERER GOES OFF-HOOK
ANS
DETECT ANS WITH PHASE REVERSALS?
NO
ANS WITH PHASE REVERSALS
ANS
DETECT V.21 FLAGS?
V.21 FLAGS
NO
DATA CALL
CALL IS:
LOW-SPEED MODEM (V.21, V.22, V.32)
ANSWERER SWITCHES BOTH SIDES TO MODEM RELAY
VOICE CALL
CONTINUE IN VOICE MODE (USING SELECTED VOICE CODEC)
ANS
BEGIN MODEM RELAY
FAX CALL
SWITCH TO FAX RELAY
MODEM CALL
CONTINUE IN MODEM RELAY

FIG. 5

FIG. 7

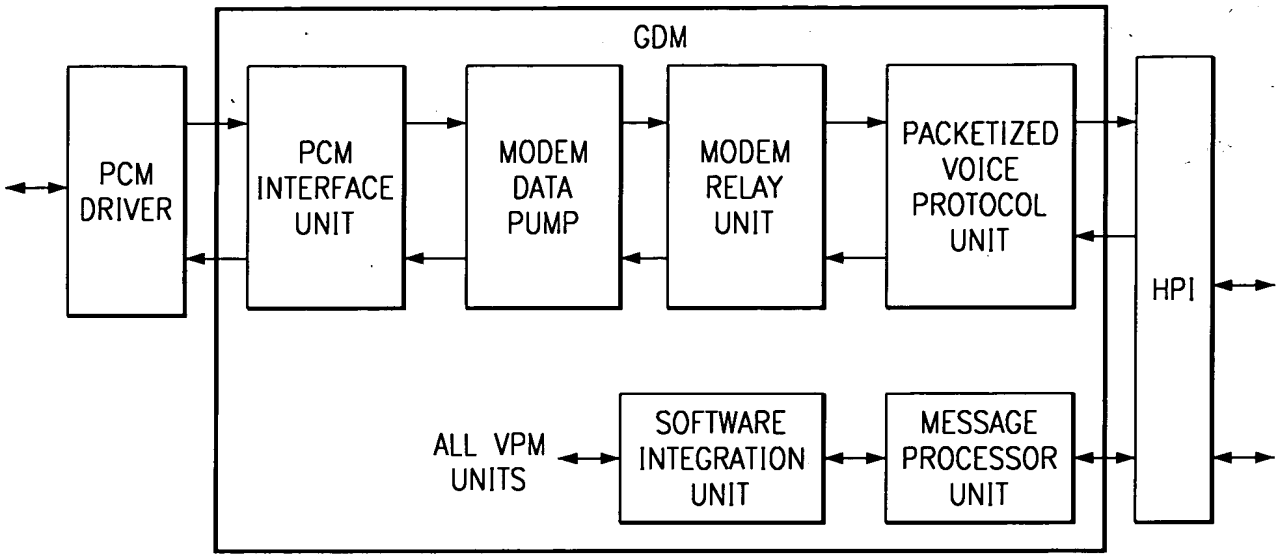
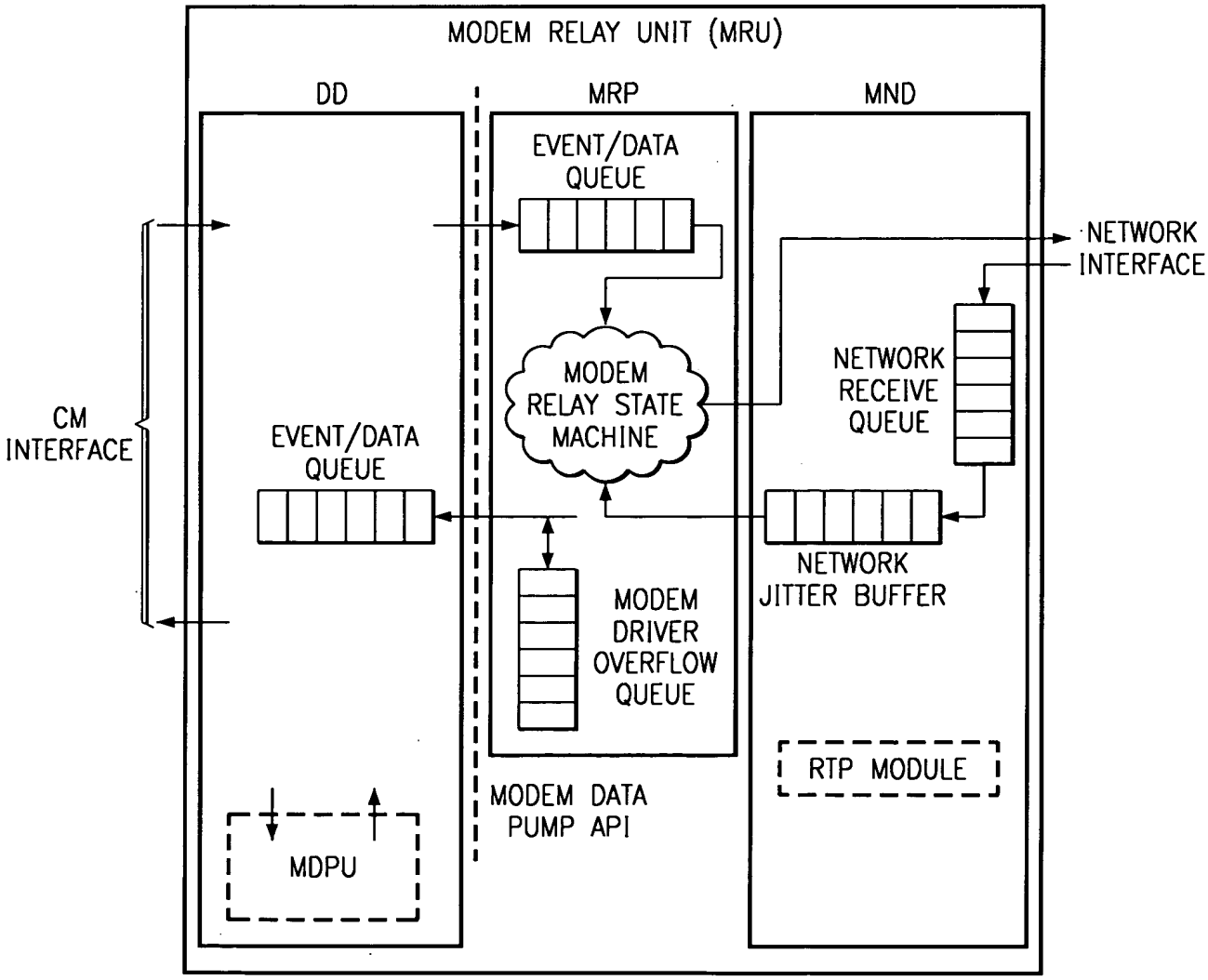

GDM
PCM DRIVER
PCM INTERFACE UNIT
MODEM DATA PUMP
MODEM RELAY UNIT
PACKETIZED VOICE PROTOCOL UNIT
HPI
ALL VPM UNITS
SOFTWARE INTEGRATION UNIT
MESSAGE PROCESSOR UNIT

FIG. 8


MODEM RELAY UNIT (MRU)
DD
MRP
MND
EVENT/DATA QUEUE
NETWORK INTERFACE
MODEM RELAY STATE MACHINE
NETWORK RECEIVE QUEUE
CM INTERFACE
EVENT/DATA QUEUE
NETWORK JITTER BUFFER
MODEM DRIVER OVERFLOW QUEUE
RTP MODULE
MODEM DATA PUMP API
MDPU

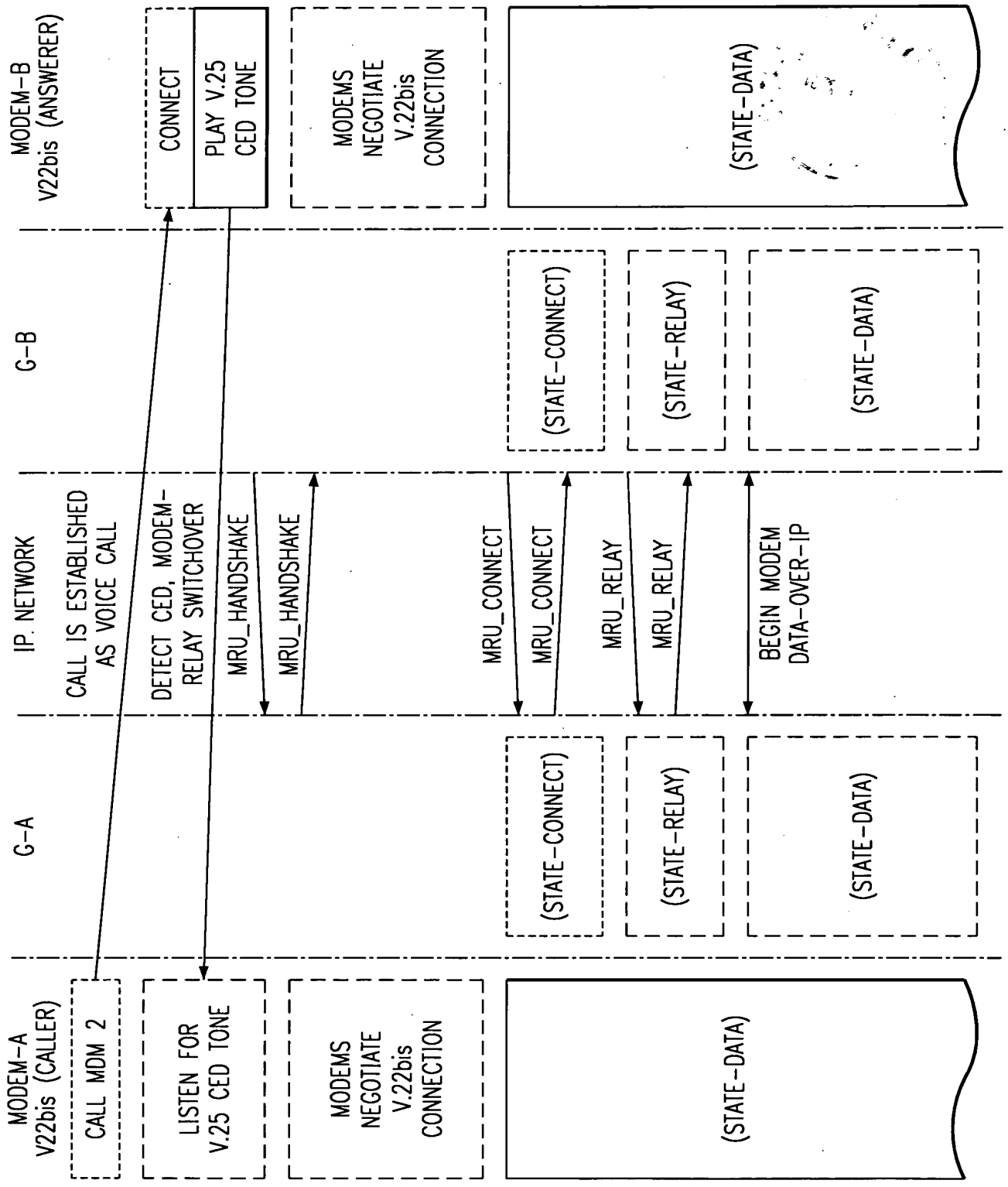

MODEM-A V22bis (CALLER)
MODEM-B V22bis (ANSWERER)
G-A
IP NETWORK
G-B
CALL MDM 2
CONNECT
PLAY V.25 CED TONE
LISTEN FOR V.25 CED TONE
CALL IS ESTABLISHED AS VOICE CALL
DETECT CED, MODEM-RELAY SWITCHOVER
MRU_HANDSHAKE
MRU_HANDSHAKE
MODEMS NEGOTIATE V.22bis CONNECTION
MODEMS NEGOTIATE V.22bis CONNECTION
MRU_CONNECT
MRU_CONNECT
MRU_RELAY
MRU_RELAY
BEGIN MODEM DATA-OVER-IP
(STATE-CONNECT)
(STATE-CONNECT)
(STATE-RELAY)
(STATE-RELAY)
(STATE-DATA)
(STATE-DATA)
(STATE-DATA)
(STATE-DATA)

FIG. 9

FIG. 10

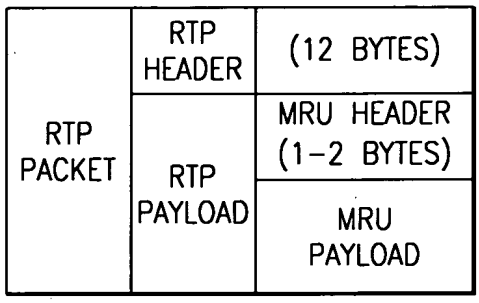

RTP PACKET
RTP HEADER
(12 BYTES)
RTP PAYLOAD
MRU HEADER (1-2 BYTES)
MRU PAYLOAD

FIG. 11

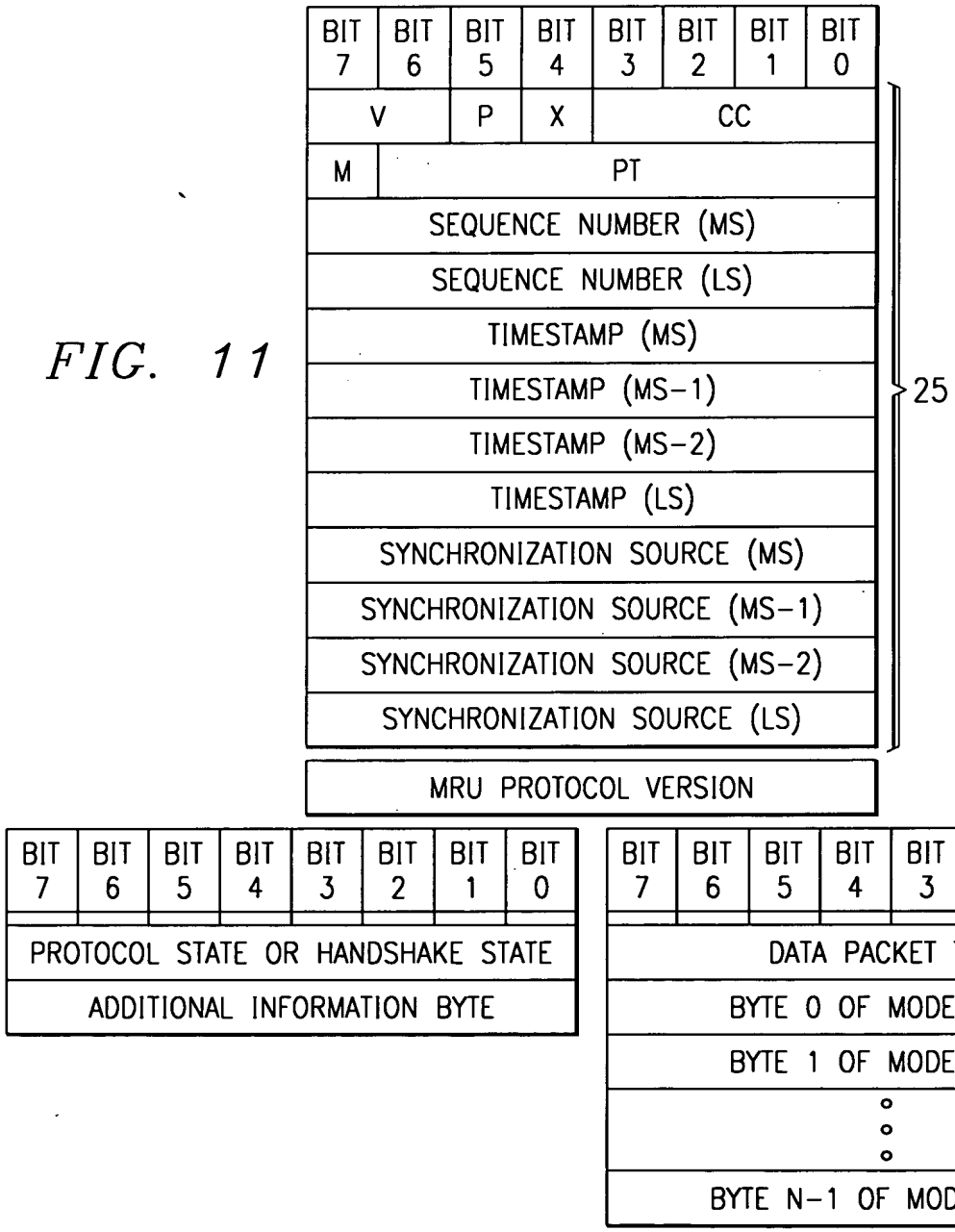

BIT 7
BIT 6
BIT 5
BIT 4
BIT 3
BIT 2
BIT 1
BIT 0
V
P
X
CC
M
PT
SEQUENCE NUMBER (MS)
SEQUENCE NUMBER (LS)
TIMESTAMP (MS)
TIMESTAMP (MS-1)
TIMESTAMP (MS-2)
TIMESTAMP (LS)
SYNCHRONIZATION SOURCE (MS)
SYNCHRONIZATION SOURCE (MS-1)
SYNCHRONIZATION SOURCE (MS-2)
SYNCHRONIZATION SOURCE (LS)
25
MRU PROTOCOL VERSION
PROTOCOL STATE OR HANDSHAKE STATE
ADDITIONAL INFORMATION BYTE
DATA PACKET TYPE
BYTE 0 OF MODEM DATA
BYTE 1 OF MODEM DATA
BYTE N-1 OF MODEM DATA

FIG. 12

MODEM RELAY PROTOCOL STATE PACKETS

PROTOCOL STATE	DESCRIPTION
OFFLINE	IDLE STATE
CARRIER LOSS	SILENCE ON THE ANALOG LINE, CARRIER LOSS
HANDSHAKE	MODEM DATA PUMPS WILL BEGIN HANDSHAKING PROCESS
CONNECT	LOCAL HANDSHAKE SESSION IS PASSED AND READY FOR MODEM RELAY
RELAY	MODEM RELAY TAKES PLACE

MODEM HANDSHAKE STATE PACKETS

HANDSHAKE STATE	DESCRIPTION
V25	V.25 ANSWER TONE IS DETECTED ON THE LOCAL ANALOG LINE
V25PR	V.25 ANSWER TONE WITH PHASE REVERSALS IS DETECTED ON THE LOCAL ANALOG LINE
V21	V.21 B1 SIGNAL IS DETECTED ON THE LOCAL ANALOG LINE
USB1	V.22 USB1 SIGNAL IS DETECTED ON THE LOCAL ANALOG LINE
S1	V.22bis S1 SIGNAL IS DETECTED ON THE LOCAL ANALOG LINE
SB1_1200	V.22bis SB1 SIGNAL @ 1200 IS DETECTED ON THE LOCAL ANALOG LINE
SB1_2400	V.22bis SB1 SIGNAL @ 2400 IS DETECTED ON THE LOCAL ANALOG LINE

MODEM DATA PACKETS

DATA TYPE	DESCRIPTION
V21	V.21 DATA @ 300 bps
V22	V.22 DATA @ 1200 bps
V22BIS	V.22bis DATA @ 2400bps